

**WHAT IS CLAIMED IS:**

- 1           1.       A method of assessing image quality, comprising:  
2           detecting a target object region in an input image;  
3           generating an image quality feature vector representing the target object  
4           region in an image quality feature space; and  
5           mapping the image quality feature vector to a measure of image quality.
- 1           2.       The method of claim 1, wherein the target object region corresponds  
2           to a human face.
- 1           3.       The method of claim 1, wherein the target object region corresponds  
2           to an object relevant to a person's subjective assessment of image quality.
- 1           4.       The method of claim 1, wherein the target object region is detected  
2           based on a sub-sampled version of the input image.
- 1           5.       The method of claim 4, wherein the image quality feature vector is  
2           generated based on a version of the target object region at a resolution of the  
3           input image.
- 1           6.       The method of claim 1, wherein the target object region is detected  
2           based on a first set of features of the input image and the image quality feature  
3           vector is generated based on a second set of features of the input image different  
4           from the first set of features.
- 1           7.       The method of claim 6, wherein the first set of features is  
2           substantially decoupled from the second set of features.
- 1           8.       The method of claim 1, wherein the image quality feature space is  
2           spanned by multiple features including at least one brightness feature describing a  
3           respective brightness characteristic of the target object region.
- 1           9.       The method of claim 1, wherein the image quality feature space is  
2           spanned by multiple features including at least one spectral feature describing a  
3           respective spatial frequency characteristic of the target object region.

1           10.    The method of claim 9, wherein generating the image quality feature  
2   vector comprises decomposing the target object region into multiple wavelet  
3   transform sub-bands.

1           11.    The method of claim 10, wherein each spectral feature describes  
2   energy in a respective wavelet transform sub-band.

1           12.    The method of claim 1, wherein the image quality feature space is  
2   spanned by multiple features including at least one noise feature describing a  
3   respective noise characteristic of the target object region.

1           13.    The method of claim 12, wherein a noise feature is computed based  
2   on a measure of noise in the target object region.

1           14.    The method of claim 12, wherein a noise feature is computed based  
2   on a measure of spatial homogeneity of spectral features each describing a  
3   respective spatial frequency characteristic of the target image region.

1           15.    The method of claim 1, wherein the image quality feature vector is  
2   mapped to a measure of image quality in accordance with a machine learning  
3   process.

1           16.    The method of claim 15, wherein the image quality feature vector is  
2   mapped to a measure of image quality in accordance with a radial basis function  
3   based machine learning process.

1           17.    The method of claim 15, wherein the image quality feature vector is  
2   mapped to a measure of image quality in accordance with a mixture of Gaussian  
3   based machine learning process.

1           18.    A system for assessing image quality, comprising:  
2           a target object region detection module operable to detect a target object  
3   region in an input image;  
4           a feature extraction module operable to generate an image quality feature  
5   vector representing the target object region in an image quality feature space; and

6           an image quality assessment module operable to map the image quality  
7       feature vector to a measure of image quality.

1           19.    The system of claim 18, wherein the target object region  
2       corresponds to a human face.

1           20.    The system of claim 18, wherein the feature extraction module  
2       detects the target object region based on a sub-sampled version of the input  
3       image.

1           21.    The system of claim 18, wherein the image quality feature space is  
2       spanned by multiple features including at least one brightness feature describing a  
3       respective brightness characteristic of the target object region.

1           22.    The system of claim 18, wherein the image quality feature space is  
2       spanned by multiple features including at least one spectral feature describing a  
3       respective spatial frequency characteristic of the target object region.

1           23.    The system of claim 22, wherein the feature extraction module is  
2       operable to generate the image quality feature vector by decomposing the target  
3       object region into multiple wavelet transform sub-bands.

1           24.    The system of claim 23, wherein each spectral feature describes  
2       energy in a respective wavelet transform sub-band.

1           25.    The system of claim 18, wherein the image quality feature space is  
2       spanned by multiple features including at least one noise feature describing a  
3       respective noise characteristic of the target object region.

1           26.    The system of claim 25, wherein the feature extraction module  
2       computes a noise feature based on a measure of noise in the target object region.

1           27.    The system of claim 25, wherein the feature extraction module  
2       computes a noise feature based on a measure of spatial homogeneity of spectral  
3       features each describing a respective spatial frequency characteristic of the target  
4       image region.

1           28.    The system of claim 18, wherein the image quality assessment  
2 module maps the image quality feature vector to a measure of image quality in  
3 accordance with a machine learning process.

1           29.    The system of claim 28, wherein the image quality assessment  
2 module maps the image quality feature vector to a measure of image quality in  
3 accordance with a radial basis function based machine learning process.

1           30.    The system of claim 28, wherein the image quality assessment  
2 module maps the image quality feature vector to a measure of image quality in  
3 accordance with a mixture of Gaussian based machine learning process.

1           31.    A system for assessing image quality, comprising:       ~  
2           means for detecting a target object region in an input image;  
3           means for generating an image quality feature vector representing the  
4 target object region in an image quality feature space; and  
5           means for mapping the image quality feature vector to a measure of image  
6 quality.

1           32.    A machine-readable medium storing machine-readable instructions       ~\n  
2 for causing a machine to:  
3           detect a target object region in an input image;  
4           generate an image quality feature vector representing the target object  
5 region in an image quality feature space; and  
6           map the image quality feature vector to a measure of image quality.

1           33.    A method of generating an image quality assessment engine,  
2 comprising:   <  
3           detecting target object regions in multiple input images;  
4           generating image quality feature vectors representing the target object  
5 regions in an image quality feature space;  
6           correlating the image quality feature vectors with respective measures of  
7 image quality assigned to the input images; and  
8           computing a mapping between image quality feature vectors and assigned  
9 measures of image quality.

1           34.    The method of claim 33, wherein the target object region  
2 corresponds to a human face.

1           35.    The method of claim 33, wherein the image quality feature space is  
2 spanned by multiple features including at least one brightness feature describing a  
3 respective brightness characteristic of the target object region.

1           36.    The method of claim 33, wherein the image quality feature space is  
2 spanned by multiple features including at least one spectral feature describing a  
3 respective spatial frequency characteristic of the target object region.